1. $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]Br$ are examples of which of the following type of isomerism?

(a) Optical (b) Linkage
(c) Coordination (d) Ionization

2. Change in composition of co-ordination sphere yields which type of isomers ?

(a) Hydrate (b) Optical
(c) Geometrical (d) None of these

3. Which of the following cannot show linkage isomerism ?

(a) H_2O (b) CN^-
(c) SCN^- (d) NO_2^-

4. Which of the following pairs show co-ordination isomerism ?

(a) $[Co(NH_3)_6]\ [Cr(CN)_6]$ and $[Mn(NH_3)_6]\ [Co(CN)_6]$
(b) $[Co(NH_3)_3(H_2O)_2Cl]Br_2$ and $[Co(NH_3)_3(H_2O)ClBr]Br \cdot H_2O$
(c) $[Pt(NH_3)_4Cl_2]Br_2$ and $[Pt(NH_3)_3Br_2]Cl_2$
(d) $[Co(NH_3)_6]\ [Cr(C_2O_4)_3]$ and $[Cr(NH_3)_6]\ [Co(C_2O_4)_3]$

5. Which kind of isomerism is shown by the complex $[Co(NH_3)_5(ONO)]SO_4$?

1. Ionisation isomerism 2. Linkage isomerism
3. Geometrical isomerism 4. Optical isomerism
(a) 1, 2, 3 and 4 are correct (b) 1, 3 and 4 are correct only
(c) 1 and 2 are correct only (d) 2, 3 and 4 are correct only

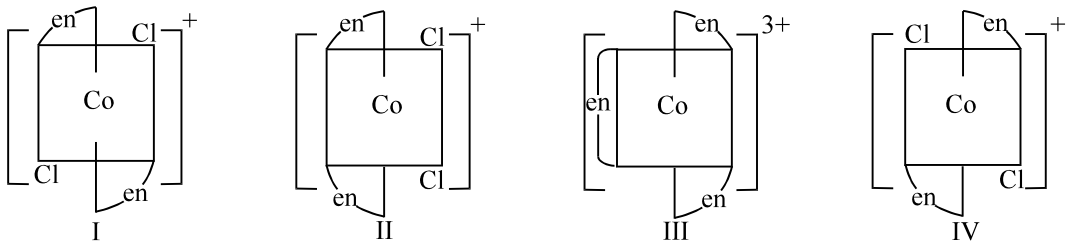
6. The number of geometrical isomers for octahedral $[Co(NH_3)_2Cl_4]^-$, square planar $[AuCl_2Br_2]^-$ are :

(a) 2, 2 (b) 2, 2
(c) 3, 2 (d) 2, 3

7. How many isomers are possible for the complex ion $[Cr(NH_3)Cl_3(OH)_2]^{2-}$?

(a) 2 (b) 3
(c) 4 (d) 5

8. Which of the following ions are optically active?



(a) I only (b) II only
(c) II and III (d) IV only

9. The IUPAC name of the complex $[Pt(NH_3)_2Cl_2]$ is

(a) Platinum (II) diammino dichloride

(b) Diammino dichloro platinate (IV)
(c) *Bis* (ammino) dichloro platinum (IV)
(d) Dichloro diammine platinum (II)

10. The formula of sodium nitroprusside is
(a) $Na_4[Fe(CN)_5NOS]$ (b) $Na_2[Fe(CN)_5NO]$
(c) $NaFe[Fe(CN)_6]$ (d) $Na_2[Fe(CN)_6NO_2]$

11. The IUPAC name of $[Co(NH_3)_3(NO_2)_3]$ is
(a) Trinitrotriammine cobalt (III)
(b) Trinitrotriammine cobalt (II)
(c) Trinitrotriammine cobalt (III) ion
(d) Trinitritriammine cobaltate (III)

12. The oxidation number of chromium in sodium tetrafluoro oxochromate complex is
(a) II (b) IV
(c) VI (d) III

13. The correct nomenclature for $Fe_4[Fe(CN)_6]_3$ is
(a) Ferroso-ferric cyanide
(b) Ferric-ferrous hexacyanate
(c) Iron (III) hexacyanoferrate (II)
(d) Hexacynoferrate (III-II)

14. The oxidation number of *Cr* in $[Cr(NH_3)_6]Cl_3$ is
(a) 8 (b) 6
(c) 4 (d) 3

15. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3]^-$ is
(a) + 1 (b) + 2
(c) + 3 (d) + 4

16. The oxidation state of cobalt in the complex compound $[Co(NH_3)_6]Cl_3$ is
(a) + 3 (b) + 6
(c) + 5 (d) + 2

17. The effective atomic number of cobalt in the complex $[Co(NH_3)_6]^{3+}$ is
(a) 36 (b) 33
(c) 24 (d) 30

18. IUPAC name of $K_3Fe(CN)_6$ is
(a) Potassium ferrocyanide (II)
(b) Potassium hexaferrocyanate (III)
(c) Potassium ferrohexacyanate (II)
(d) Potassium hexacyanoferrate (III)

19. In the coordination compound, $K_4[Ni(CN)_4]$ oxidation state of nickel is
(a) -1 (b) 0
(c) $+1$ (d) $+2$

20. The proper name for $K_2[PtCl]_6$ is
(a) Potassium platinum hexachloride
(b) Potassium hexachloro platinum IV
(c) Potassium hexachloro platinate IV
(d) Potassium hexachloro platinum

21. Pick the correct name of $[Co(NH_3)_5Cl]Cl_2$
(a) Chloropentammine cobalt (III)
(b) Pentammine cobalt (III) chloride
(c) Chloropentammine cobalt (III) chloride
(d) Chloropentammine cobalt (II) chloride

22. The complex chlorocompound diaquatriammine cobalt (III) chloride is represented as
(a) $[Co(NH_3)_3(H_2O)_3]Cl_2$
(b) $[Co(NH_2)_3(H_2O)_2]Cl_2$
(c) $[CoCl(NH_3)_3(H_2O)_2]Cl_3$
(d) $[CoCl(NH_3)_3(H_2O)_2]Cl_2$

23. IUPAC name for $K[Ag(CN)_2]$ is
(a) Potassium argentocyanide
(b) Potassium silver cyanide
(c) Potassium dicyanoargentate (I)
(d) Potassium dicyanosilver (II)

24. The pair of the compounds in which both the metals are in the highest possible oxidation state is
(a) $[Fe(CN)_6]^{3-}, [Co(CN)_6]^{3-}$
(b) CrO_2Cl_2, MnO_4^-
(c) TiO_3, MnO_2
(d) $[Co(CN)_6]^{3-}, MnO_3$

25. The IUPAC name of $K_2[Cr(CN)_2O_2(O)_2(NH_3)]$ is
(a) Potassium ammine dicyano dioxoperoxochromate (VI)
(b) Potassium ammine cyano peroxo dioxo chromium (VI)
(c) Potassium ammine cyano peroxo dioxo chromiun (VI)
(d) Potassium ammine cyano peroxo dioxo chromatic (IV)

26. The IUPAC name of the coordination compound $K_3[Fe(CN)_6]$ is
(a) Potassium hexacyanoferrate (II)
(b) Potassium hexacyanoferrate (III)
(c) Potassium hexacyanoiron (II)

(d) Tripotassium hexacyanoiron (II)

27. Oxidation state of Cr in $K_2Cr_2O_7$ is:

(a) + 5 (b) +6
(c) +7 (d) zero

28. Aluminium phosphide is :

(a) AlP_3 (b) Al_2P_3
(c) AlP (d) Al_3P_2

29. Mercurous azide is

(a) $Hg_2(N_3)_2$ (b) HgN_3
(c) Hg_2N_3 (d) $Hg(N_3)_2$

30. In the conversion of Br_2 to BrO_3^-, the oxidation state of bromine changes from-

(a) 0 to + 5 (b) – 1 to + 5
(c) 0 to –3 (d) +2 to +5

1. (d) Ionization isomerism arises due to the exchange of ligand(s) between ionization sphere and ionic sphere.

2. (a) $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_4Cl_2]Cl.2H_2O$ are hydrate isomers. This is due to the change in composition with respect to water molecules.

3. (a) H_2O is no ambidentate ligand. CN^-, SCN^- and NO_2^- are ambidentate ligands which can attach to central metal atom through either of the two donor atoms.

4. (d) Co-ordination isomerism occurs when both cation and anion are complex, caused due to interchange of ligands between two complex ions of the same complex.

5. (c) NO_2^- is an ambidentate ligand and can link to central metal ion either through N or O. Hence it show linkage isomerism.

There is exchange of NO_2^- and SO_4^{2-} occurs between coordination sphere and ionization sphere. Hence it show ionisation isomerism.

Ma_5b has only one form, therefore, it does not show geometrical isomerism.

Ma_5b has mirror plane , therefore, it does not show optical isomerism.

6. (b)M a_2b_4 has two geometrical isomers one cis- and one trans. Similarly Ma_2b_2 also has one cis- and trans-forms.

7. (b)It is Ma_3b_2c type so = 3 i.e. (aa)(ab)(bc) (optically inactive)

(aa)(bb)(ac) (optically inactive)

(ab)(ab)(ac) (optically inactive)

8. (c) (a) I is trans form which has centre of symmetry as well as plane of symmetry ; so optically inactive

(b) II is cis form which lacks centre of symmetry as well as plane of symmetry ; so optically active

(c) (II) and (III) lack symmetry elements ; so both are optically active.

(d) IV is trans form which has centre of symmetry as well as plane of symmetry ; so optically inactive

9. (d) Follow IUPAC rule.

10. (b) Follow IUPAC rule.

11. (a) Follow IUPAC rule.

12. (b) $Na_2[CrF_4O]$

$x + 4(-1) + (-2) = -2$

$x - 6 = -2 \Rightarrow x = +4$.

13. (c) Follow IUPAC rule.

14. (d) $x + 6 \times (0) + 3 \times (-1) = 0$

$x - 3 = 0$, $x = +3$, Oxidation number of Cr is $= +3$.

15. (b) $[\underset{x}{Pt}(\underset{0}{C_2H_4})\underset{-1}{Cl_3}]^-$

$x + 0 + 3x(-1) = -1$, $x - 3 = -1$, $x = +2$.

16. (a) $[Co(NH_3)_6]Cl_3 \rightarrow [Co(NH_3)_6]^{3+} + 3Cl^-$

$x + 6(0) = +3 \Rightarrow x = +3$.

17. (a) EAN = at. no. of central atom - oxidation state $+ 2 \times$ (no. of ligands) $= 27 - 3 + 2 \times 6 = 36$.

18. (d) Follow IUPAC rules for nomenclature.

19. (b) $+1 \times 4 + x - 1 \times 4 = 0$

$4 + x - 4 = 0 \Rightarrow x = 0$ for Ni.

20. (b) Follow IUPAC rule.

21. (c)

22. (D)

23. (c) Follow IUPAC rule.

24. (b) $\overset{+6}{Cr}O_2Cl_2$, $\overset{+7}{Mn}O_4$.

25. (a) It is potassium ammine dicyano dioxo peroxo-chromate (VI)

26. (b) Potassium hexa cyanoferrate (III).

27. (b)
28. (c)
29. (a)
30. (a)